

Based Upon: PCT/CH03/00004

**REMARKS**

Applicant respectfully requests entry of the above Preliminary Amendment to place this U.S. Patent Application in better form for examination and prosecution before the U.S. Patent and Trademark Office.

The claims have been amended to more definitely and fully claim the subject matter of Applicant's invention. Applicant urges that the above Preliminary Amendment introduces no new matter into this U.S. Patent Application.

Applicant sincerely believes that this U.S. Patent Application is now in condition for examination and prosecution before the U.S. Patent and Trademark Office.

Respectfully submitted,



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## Field of the Invention

A plastic closure able to be manufactured in the closed state, as well as an injection mould and method for its manufacture.

~~This~~ The present invention relates to a plastic closure comprising a lower part and a cap and a snap hinge via which the two closure parts are connected to one another as one piece, wherein the lower part and the cap are able to be manufactured in the closed state and [additionally] also can be connected to one another via at least one separation seam. [The] ~~This~~ invention relates [further] to an injection mould for manufacturing [such] plastic closures [as well as additionally] and to a method with which the above-mentioned closures may be manufactured [whilst] using the injection [moulds] molds according to ~~this~~ the invention.

## Discussion of Related Art

Closures [of the initially mentioned type] are known for example from CH-A-673'631. <sup>Swiss Patent Reference</sup> 673,631 With this it is the case of a plastic closure [whose] lower part may be placed on a bottle neck or onto an adapter fastened on the bottle neck. The snap effect of the closure is produced with a spring element which is a bending spring [which] projects from the container wall from the outside into the inner space of the closure. [On account of this] ~~thus~~ the snap effect is not achieved by the deformation of the container walls but solely by the restoring force of the U-shaped spring element.

Openings in the closure walls of the plastic closure are [absolutely] necessary for manufacturing the known plastic closures. On the one hand an opening needs to be present in the outer, peripheral lateral wall [skirt] in order to shape the U-shaped spring on the inner side, and on the other hand a recess needs to be [present] in the cover surface in order to achieve the upper, outer surface of the U-shaped spring.

The manufacture of such a closure [as a result of this] <sup>thus</sup> necessitates relatively large [mould] mold slides or sliders which [on the one hand] renders the injection [moulds] <sup>molds</sup> considerably more expensive and [on the other hand] <sup>also</sup> extends the cycle times. Accordingly, plastic closures of this known type [as a result] are relatively expensive and up to [the present day] <sup>now</sup> could not assert themselves [on the market] ~~in the marketplace~~

Finally, the lack of design freedom is a problem [which can hardly be solved]. The manufacturability specifically [compellingly] requires a conical or step-like shaping of the plastic closure, wherein the lateral walls of the cap with respect to the lower part need to be arranged offset to one another at least by the wall thickness.

<sup>Swiss Patent Reference</sup> The same concept as in CH-A-673'631 has also been [realised in CH-683'611]. Here [too] <sup>673,631</sup> <sup>683,611</sup> the plastic closure which is injected in the closed state is [realised by way of arranging the lower part and the cap conically on top of one another. Here, in contrast to the first mentioned design

<sup>taught by Swiss Patent Reference</sup>

there is

[one however realises] a snap hinge which is not achieved by [way of] a spring element designed as a bending spring, but by [way of] two flat intermediate elements [via] which the tensile forces are transmitted, wherein [however] the spring force is [realised] solely by the deformation of the adjacent container walls. At the same time, it is necessary for the container walls of the lower part and the cap to run inclined towards the [centre] axis at least in the hinge region. Although such a closure may be manufactured without a slider, it may not [however] be used on conventional bottle necks without an adapter. The necessary conicity results in a diameter difference between the lower part and the sealing peg in the cap which is larger than common bottle necks.

one

### SUMMARY OF THE INVENTION

It is [therefore the] object of [the present] invention to provide a plastic closure of the [initially] mentioned type which requires only particularly simple injection [moulds] (and which [accordingly] manufactured with short cycle times and [permits] a cylindrical shaping of the outer contour.

This object is achieved by a plastic closure [of the initially mentioned type with the characterising features of patent claim 1.] as described in this specification and in the claims.

[Another] [A further] object of [the present] invention is to manufacture an injection [mould] for manufacturing plastic closures of the above mentioned type, which are [extremely] economical [in] to manufacture and [which] may function with short cycle times.

An injection [mould] with the features of patent claim 16 achieves this object. [is also described in this specification and in the claims.]

[Finally the] [This] invention also relates to a method for manufacturing the closures of the initially mentioned type [whilst] using the previously mentioned injection [mould, said] method [having the] features [of patent claim 19. Further] [and other] [this] design forms of the respective [invention] are [to be] deduced from the dependent claims and their significance is [explained] in the subsequent description [and in the claims.]

[In one] [A preferred] embodiment, [example] of the plastic closure according to [the] invention is represented in the accompanying drawing, whereby a representation of the injection [mould] as well as [a] schematic representation of the method is not [made] since [the] man skilled in the art would not require such a representation on account of the subsequent explanations. [person]

### BRIEF DESCRIPTION OF THE DRAWINGS

[The single preferred] [embodiment] [example] of [the] plastic closure according to [the] this invention is shown in the drawings. [There are shown in: *wherein*]

Figure 1 is [a] a lateral view of [the] plastic closure according to [the] invention manufactured in [the] a closed state, placed onto a partly shown container neck [and];

as Figure 1 but  
 Figure 2 shows the same view after removal of the guarantee strip [and] ; Figures 1  
 Figure 3 shows again the same plastic closure, this time as shown in Figures 1 and 2 but  
 opened condition and [finally]

Figure 4 shows a vertical section taken through the plastic closure according to Figure 1, before opening for the first time, again shown placed onto a container neck.

**DETAILED DESCRIPTION OF THE INVENTION**

The plastic closure manufacturable in the closed state is shown in its entirety at [ sic ] It [and] and comprises a lower part 2 and a cap 3. The lower part 2 and the cap 3 are rotationally symmetrical with regard to the [ centre ] axis A. The lower part 2 comprises a lateral wall [skirt] 5 and the cap 3 comprises a lateral wall [skirt] 6. The lower part 2 and the cap 3 are connected to one another as one piece via a snap hinge 4. Furthermore, the lower part 2 and the cap 3 are connected to one another via at least one separation seam 7. At the same time the at least one separation seam 7 always runs from one side of the snap hinge 4 circumferentially about the periphery of the plastic closure 1 to the other side of the snap hinge 4. The separation seam 7 may be formed by a continuous separation line which is only interrupted by several destroyable bridges. In the preferred example shown here it is however the case of continuous thin locations [which] form a so-called tear seam. These tear seams 8 in particular [may be] clearly seen in Figure 4, in which the closure is shown in an enlarged scale. Here [it is] conspicuous that not a single tear seam 7 is present but that there are two tear seams 7 and 7' running parallel to one another between which a guarantee strip 9 is present. This guarantee strip 9 at least on one side [in the vicinity of the snap hinge 4] comprises a tear-open tab 10. In the normal case [and the preferred solution] the closure is not only rotationally symmetrical with respect to the axis A, but the lateral walls 5,6 represent sections of the same circular cylinder. The lateral walls 5,6 are thus situated vertically on top of one another in a completely flush manner. Thanks to this shaping the closure may also be used on standard bottle necks. As a result of this, the container B requires no specially shaped bottle neck F. The cap 3 may thus be provided with [have] an annular sealing wall 10 which forms a sealing plug 11 [which] that comes to lie directly into the bottle neck F in a sealing manner without an adapter piece. By way of this not only are the manufacturing costs saved but also the assembly costs. The closure represented here may be pressed onto the container with conventional assembly machines without any problem and with a large cadence. In particular, [on account of] the use of continuous tear seam 8, there also exists no danger that the fragile bridges are destroyed [in the region of the separation seam during assembly]. The fastening of the closure 1 on the container neck F is effected with [means which are] directly integrally formed on the lateral wall [skirt] 5 or skirt 5 of the lower part 2. In the [shown] example, this is an inwardly projecting peripheral retaining bead 12. Instead of the retaining bead 12 [one may of course also provide] retaining bead sections. In particular, in [the] Figures 1 and 4 [one may clearly see that] the lateral walls of the upper part

and the lower part in the embodiment shown [here] are completely smooth on the outer surface. In contrast to this, the inner surfaces of the lateral walls of the upper part and lower part comprise inward formations and outward formations. Inward formations and outward formations are [to be] understood [here] as changes in the wall thickness, wherein recesses in the lateral wall [skirt] or skirt surface are indicated as inward formations which are considered here [whilst] outward formations are considered [here] as protuberances with respect to the lateral wall [skirt] surface. In the example shown here, all inward formations and outward formations are arranged on the inner surface of the lateral walls of the lower part and lid. This is [definitely the most] <sup>one</sup> sensible design but it is also [not ruled out] <sup>possible</sup> to incorporate all inward formations and outward formations on the outer surfaces of the lower part and the lid. For achieving the object according to [the] <sup>this</sup> invention, it is [absolutely] necessary for the snap hinge to lie in the lateral wall [skirt] regions of the closure which run parallel to the closure and opening movement direction of the injection [mould]. An injection [mould] in the simplest case [consists of] two tool halves. These tools are mostly also called plates. [Whilst] the one tool half comprises cavities which form the outer surfaces of the closure manufactured therein, the other tool half comprises so-called mandrels which when traversing together the two tool halves enter the cavities of the other tool half. The remaining cavity is filled with plastic and forms the plastic closure to be produced. [Whilst one was earlier of the opinion that] <sup>while</sup> ~~no~~ shape deviations from this movement direction [are] allowable, on the lateral walls which run parallel to the opening and closure movement without suitable sliders or other moving parts [being] provided on the injection [mould], [today] <sup>now</sup> [one has] moved away from this <sup>position</sup>. In particular, threads on closures or retaining beads are [regarded as being as] <sup>now</sup> permissible. It is essential that [firstly] the two injection [mould] parts are traversed apart, so that the material may escape at least on one side, in order to completely remove the respective injection <sup>mold</sup> object from the <sup>mold</sup>. The plastic closure according to [the] <sup>this</sup> invention was conceived in its [entire] design on the basis of this [discovery]. In particular, with snap hinge closures, this manufacturing concept until now has <sup>not</sup> ~~never~~ been used for producing the snap hinge. Particularly aesthetic closures result from this concept if the lateral walls of the lower part 2 and the cap 3 at least in the region of the snap hinge are arranged lying in a flush manner on top of one another. With this, the region is [to be] understood as a cylinder sector, [that is to say] <sup>and</sup> the regions of the snap hinge up to the cover surface 13 of the lid, and from the snap hinge 4 to the lower edge 14 of the lower part 2 lie on top of one another in a completely flush manner. The adjacent wall regions may [however indeed] be designed [running] <sup>to run</sup> in an inclined manner. This however [is] ~~not~~ desirable in many cases. Accordingly, one would preferably arrange the lateral walls 5, 6 lying on top of one another in a completely flush manner.

As [already] mentioned, only the inner surfaces or only the outer surfaces should have inward formations and/or outward formations. [These] <sup>The</sup> inward formations and/or outward formations may at the same time not exceed the wall thickness of the lateral walls. This [of course] is [to be] understood <sup>as</sup> within the framework of the usual accuracies and tolerances. [Of course, the] <sup>The</sup>

larger the total diameter of the closure, the larger the <sup>possible</sup> relative deviation [may be]. This [of course] is known to the <sup>person</sup> skilled in the art of plastics technology, and does not have to be explained any further.

One [is relatively free] with regard to the shaping of the guarantee strip. However, the guarantee strip 9 [as well as] the tab 10 [always] in practise form part regions of the lateral walls 5, 6 which lie on top of one another. The closure may only be opened by tearing away the guarantee strip 9. As [already] mentioned, and represented in the drawing, the separation seams 7, 7' which delimit the guarantee strip run parallel to one another. If both separation seams run parallel to one another then they may run perpendicular or inclined relative to the [centre] <sup>center</sup> axis or to the central [centric] middle axis A of the closure. Of course the separation seams 7, 7' may also be arranged in planes running differently to the [centric] <sup>central</sup> middle axis A, wherein in the special case the one separation seam may run perpendicularly to the [centric] <sup>central</sup> middle axis and the second separation seam 7 may run inclined to the [centric] middle axis A.

#### European Patent Reference

The snap hinge [which was applied here] corresponds essentially to a snap hinge as [is] known from EP-A-0'056'469 or from US-A-3,135,456. These are snap hinges which are formed essentially of two film hinges. Whilst the one film hinge 41 represents the movable connection between the lateral wall [skirt] 6 of the cap 3 and an intermediate element 43, the second film hinge 42 forms the separation line between the lateral wall [skirt] 5 of the lower part 2 and the [mentioned] intermediate element 43 of the snap hinge 4. The snap hinge has lateral limitations 44 which are formed by a gap. The film hinges 41, 42 between the two lateral limitations 44 may have various running directions. [With regard to this,] <sup>thus</sup> the previously mentioned documents are <sup>incorporated by</sup> <sub>reference</sub> referred to. Basically, however, the film hinges 41, 42 may centrally approach one another or run part between the two limitations 44. Furthermore, the film hinges may have an arcuate <sup>shape</sup> course, or one which is sharply bent, and they may approach one another to such an extent that they mutually contact, by which [means] two lateral intermediate elements 45 transmitting tensile forces arise. As [already] mentioned, the lateral limitations 44 are separated from the lateral walls 5, 6 by a gap. This gap 46 thus forms the separation between the intermediate element or the intermediate elements or between the elements and the adjacent lateral walls 5, 6. However, the lateral limitations 44 may however also be connected to the adjacent lateral walls practically as an additional guarantee element, wherein [these] <sup>the</sup> connections need to be designed as separation seams. When opening the closure for the first time, these separation seams would tear.

As [already] mentioned, the plastic closures according to (the) <sup>this</sup> invention may be manufactured by [way of] injection [moulds], wherein an injection mould <sup>includes</sup> consists of two plates of which the one plate comprises the cores and the other plate the cavities. At the same time, at least one of the two plates has no recesses or protuberances on the surfaces parallel to the extension direction of the plate. Accordingly, plastic closures which are manufactured by [way of] these

or skirt

injection moulds <sup>molds</sup> have no inward formations or outward formations on the corresponding lateral wall <sup>(skirt)</sup> surfaces. For the manufacture of the closures as are represented in the Figures 1 to 4, the plate with the mandrels with the surfaces parallel to the extension direction have protuberances and/or recesses which form the corresponding outward formations and/or inward formations, <sup>while</sup> <sup>whilst</sup> the cavities on the other plate on the surfaces lying parallel to the extension direction have no recesses or protuberances <sup>whatsoever</sup>. [Of course a] <sup>corresponding</sup> reversion is likewise possible <sup>as is specified in claim 17.</sup>

If one operates with the [just] described injection moulds <sup>molds</sup> in order to shape the corresponding closures, it is [thus] necessary to [firstly] extend that plate which has no recesses or protuberances on the surfaces running parallel to the extension direction. If then the closures are set free on one side, then they may be ejected under suitable elastic deformation from the other plate on which corresponding recesses or protuberances are [present] parallel to the extension and retraction direction of the moulds. Usually, with this, as already mentioned, one would shape the cavities free of recesses and protuberances. Accordingly, <sup>firstly</sup> the plate comprising the cavities is retracted and after this the cores are pulled from the closures. Again, a reversion is also possible <sup>[here]</sup>. If the closures have smooth inner surfaces of the lateral walls, one may then <sup>[firstly]</sup> <sup>first</sup> pull the cores from the closures and of course after this eject the closures from the cavities.

[ List of reference numerals

A centre axis

B container

F bottle neck

1 plastic closure

2 lower part

3 lid

4 snap hinge

5 lateral wall (skirt) of the lower part

6 lateral wall (skirt) of the lid

7 separation seam

8 tear seam

9 guarantee strip

10 annular wall

11 sealing plug

12 retaining bead

13 cover surface

14 lower edge of the lower part 2

41 film hinge

42 film hinge

43 intermediate element

44 lateral limitation

45 intermediate element

46 gap ]